



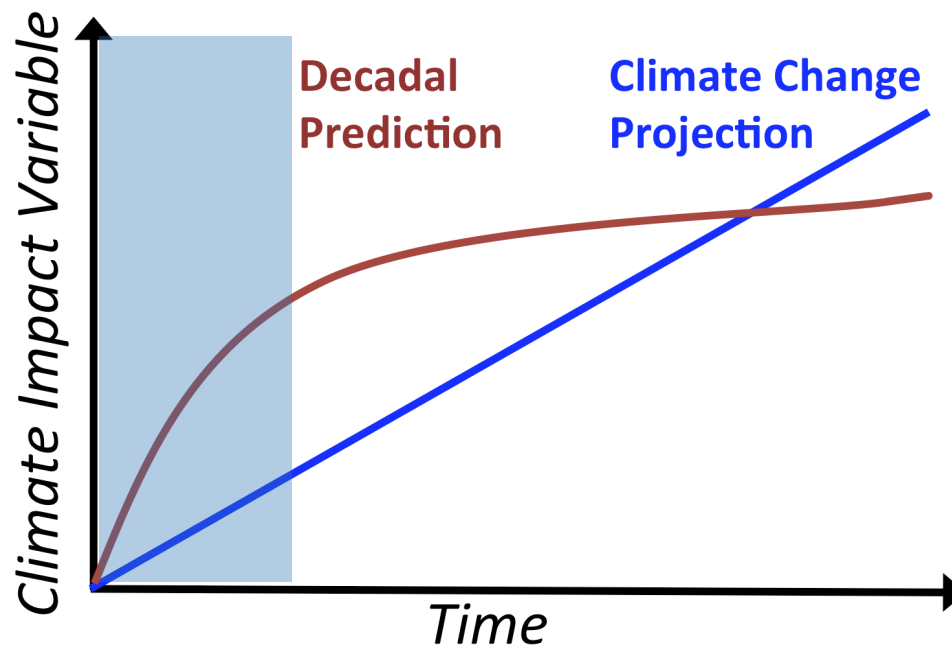
Atmospheric River Characteristics under Decadal Climate Variability

James Done and Ming Ge

Thanks to Heather Lazrus, Rebecca Morss, Erin Towler and Mari Tye

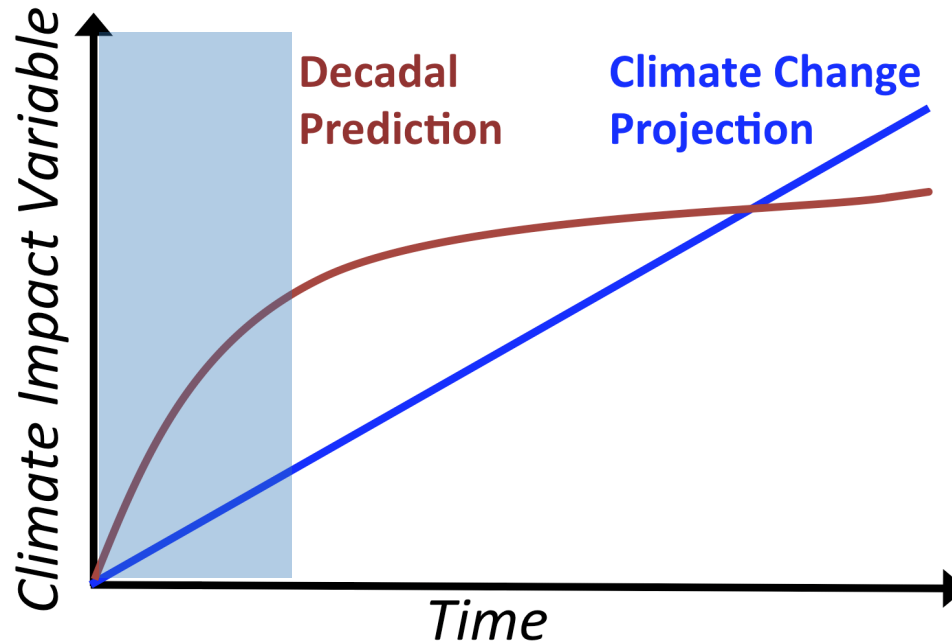
Understanding Decision-Climate Interactions on Decadal Scales

NSF grant 1419563



Understanding Decision-Climate Interactions on Decadal Scales

NSF grant 1419563



Part 1: Understand climate information needs and use.

Part 2: Build predictive capacity for the needed information.

Key Reservoir Management Question:

Will there be another Atmospheric River behind this one?

Science Question:

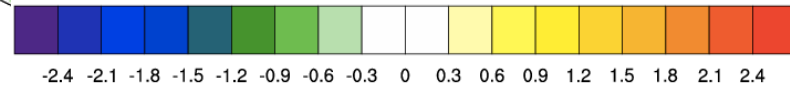
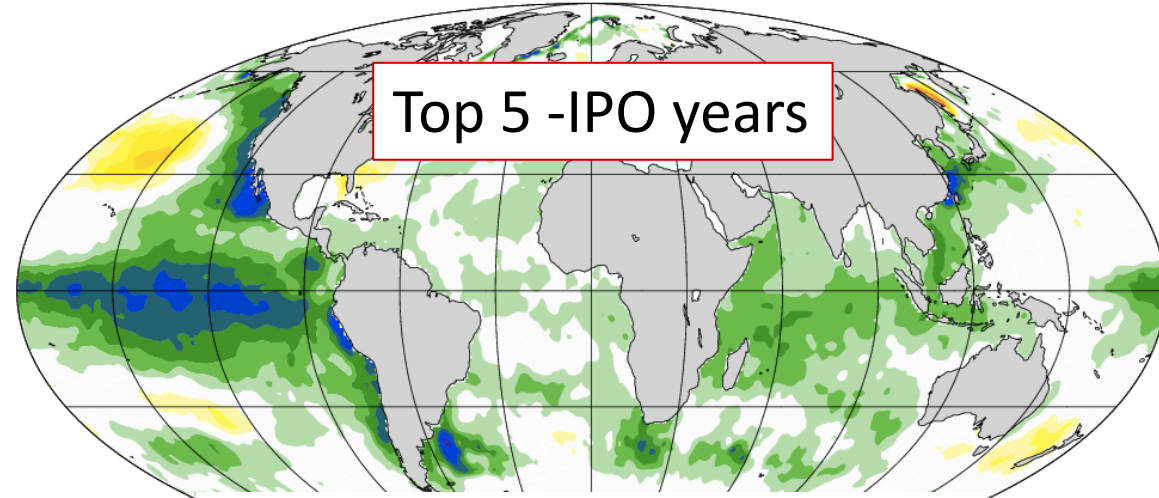
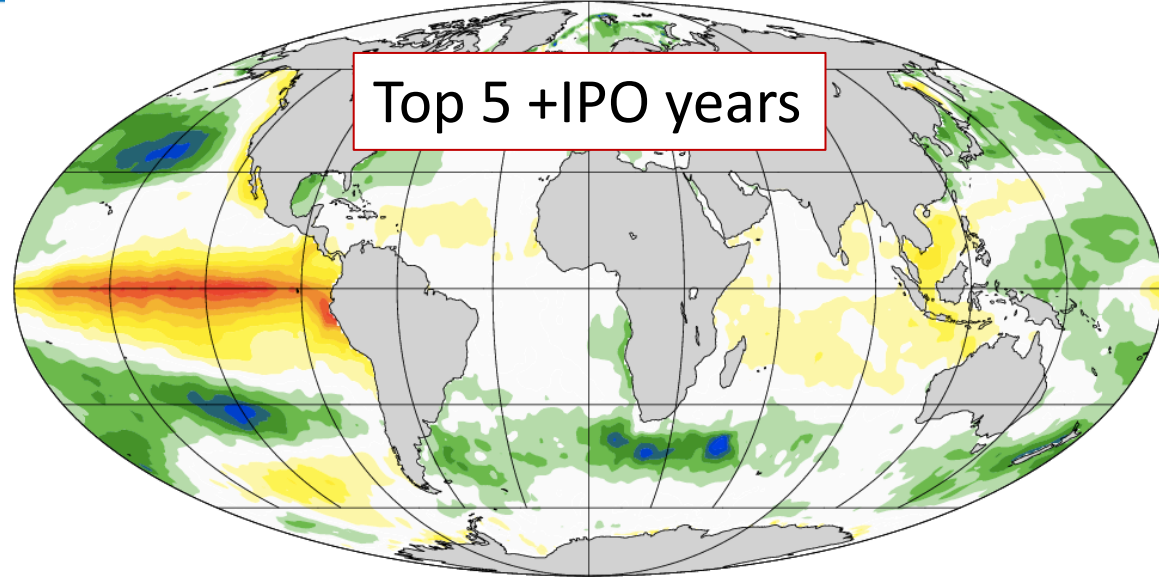
How does decadal climate variability condition the predictability and characteristics of atmospheric rivers?

Interdecadal Pacific Oscillation

NCAR
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

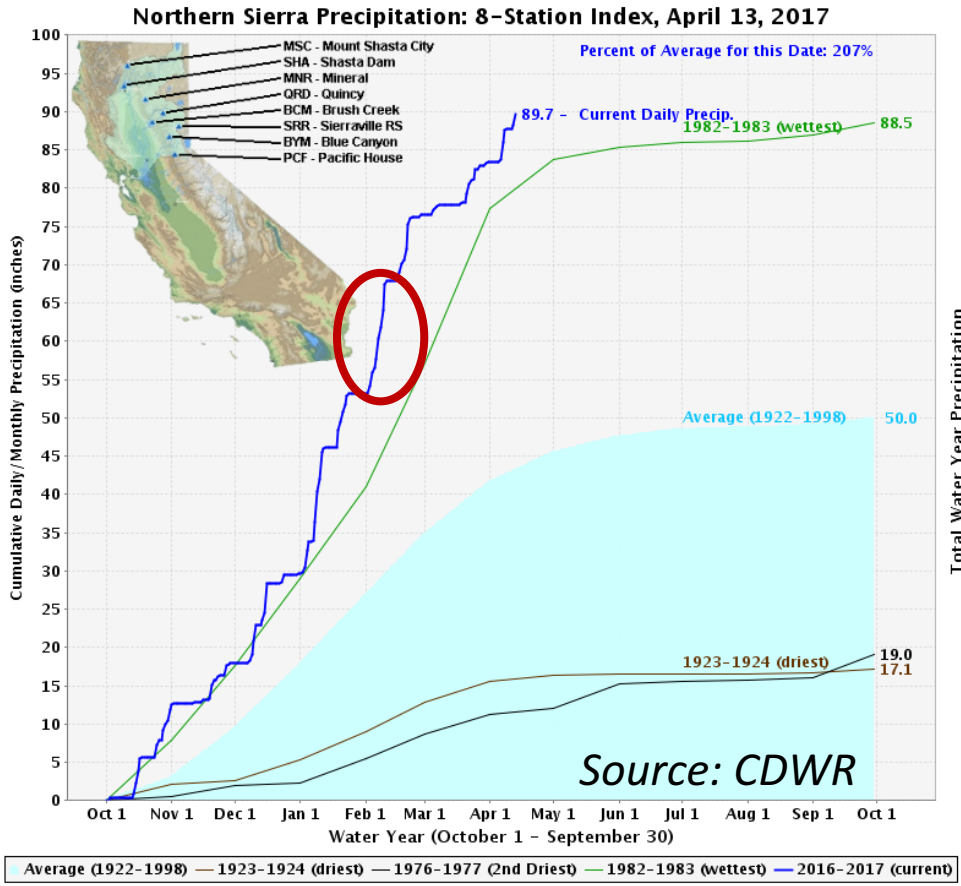
Composite HadISST
Sea Surface Temperature
Anomalies

Using IPO Tripole Index
(Henley et al. 2015)



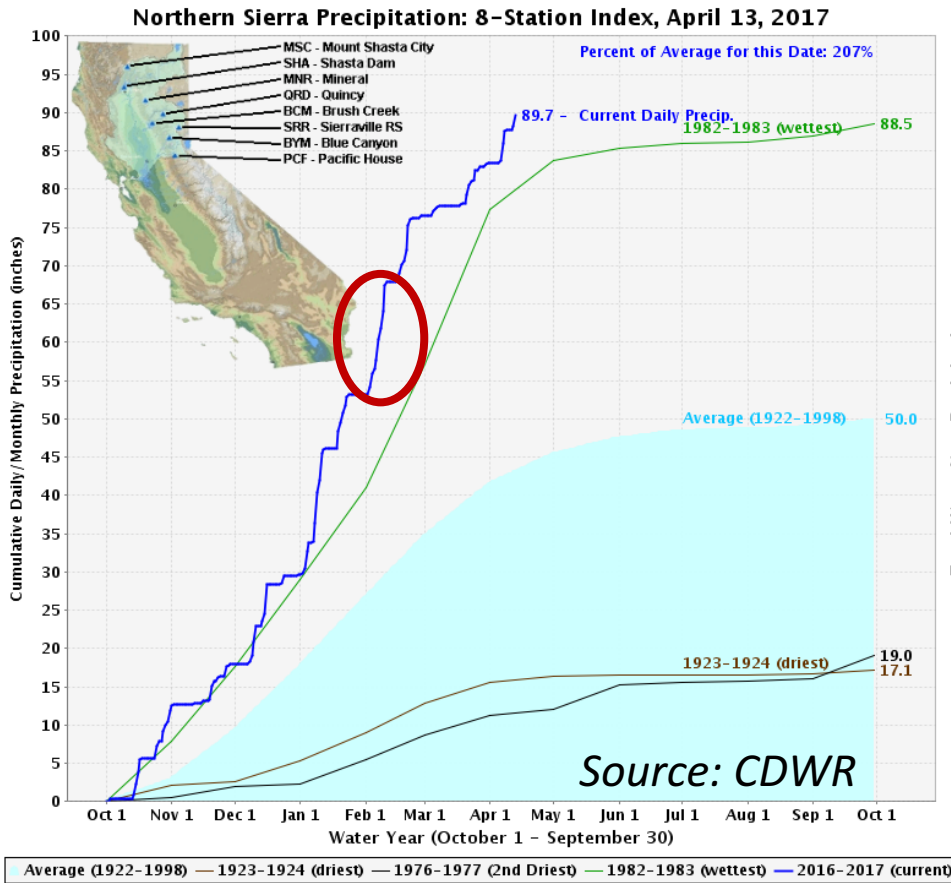
Oroville Dam Case Study

Wettest season in 100 years.

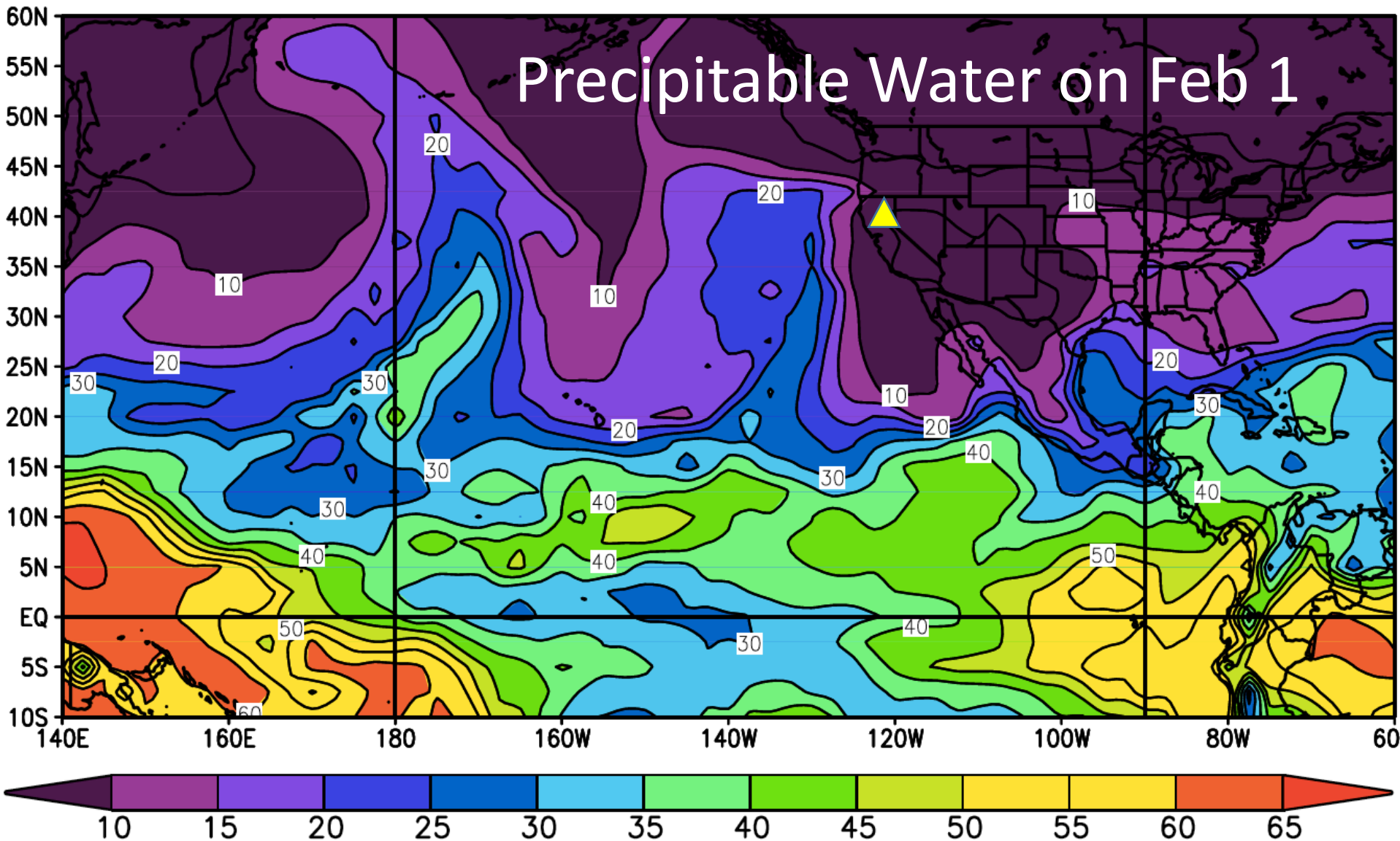


Oroville Dam Case Study

Wettest season in 100 years.

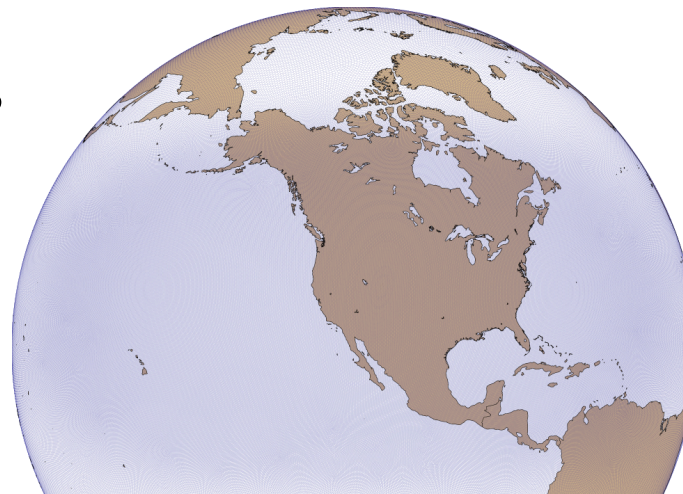


An Active Pattern



Global Ensemble Simulations

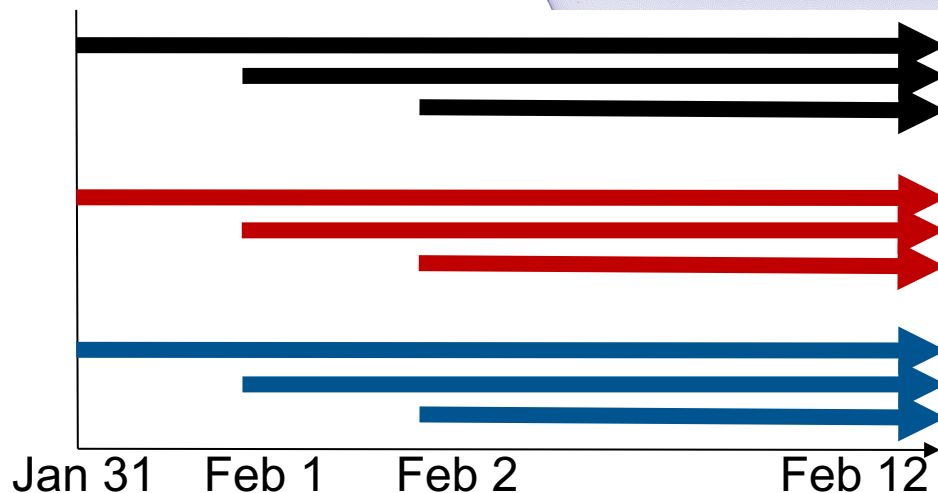
Model for Prediction Across Scales
Mesh-refinement: 60km – 15km



**Control Ensemble
(ERA-I SSTs)**

**+IPO Ensemble
(+IPO SST anomaly)**

**-IPO Ensemble
(-IPO SST anomaly)**

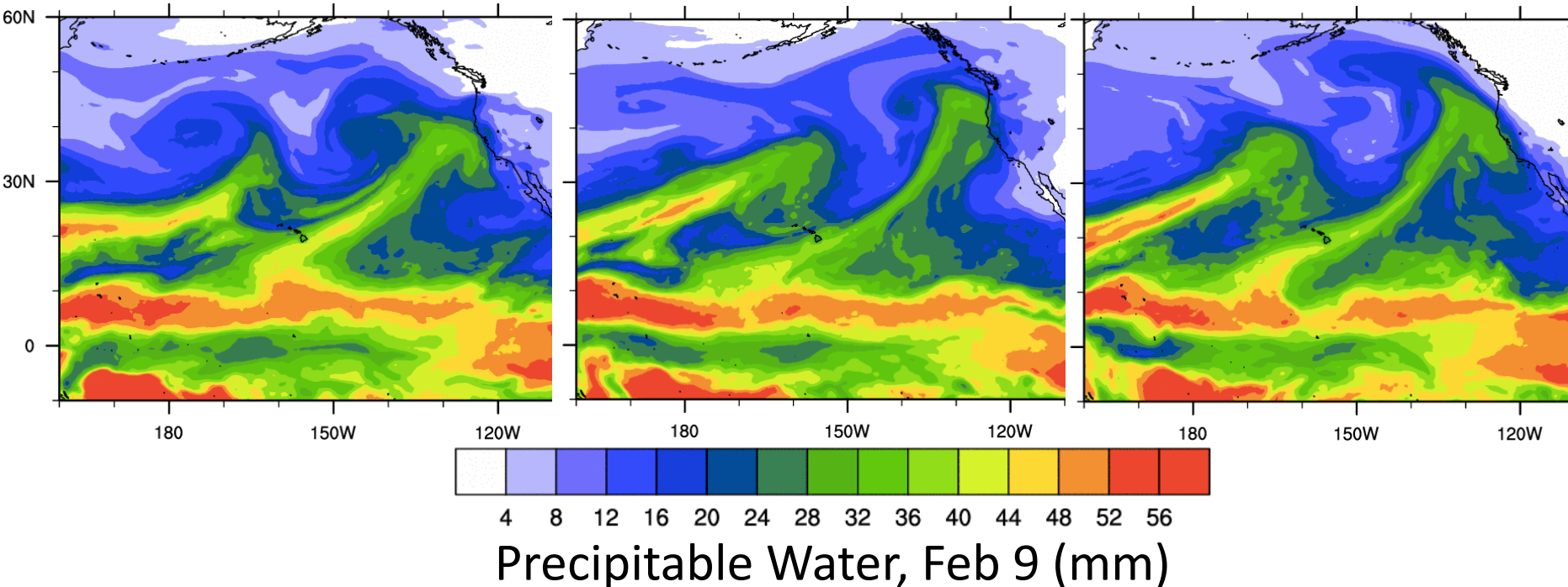


Control Ensemble

9-Day forecast

8-Day forecast

7-Day forecast



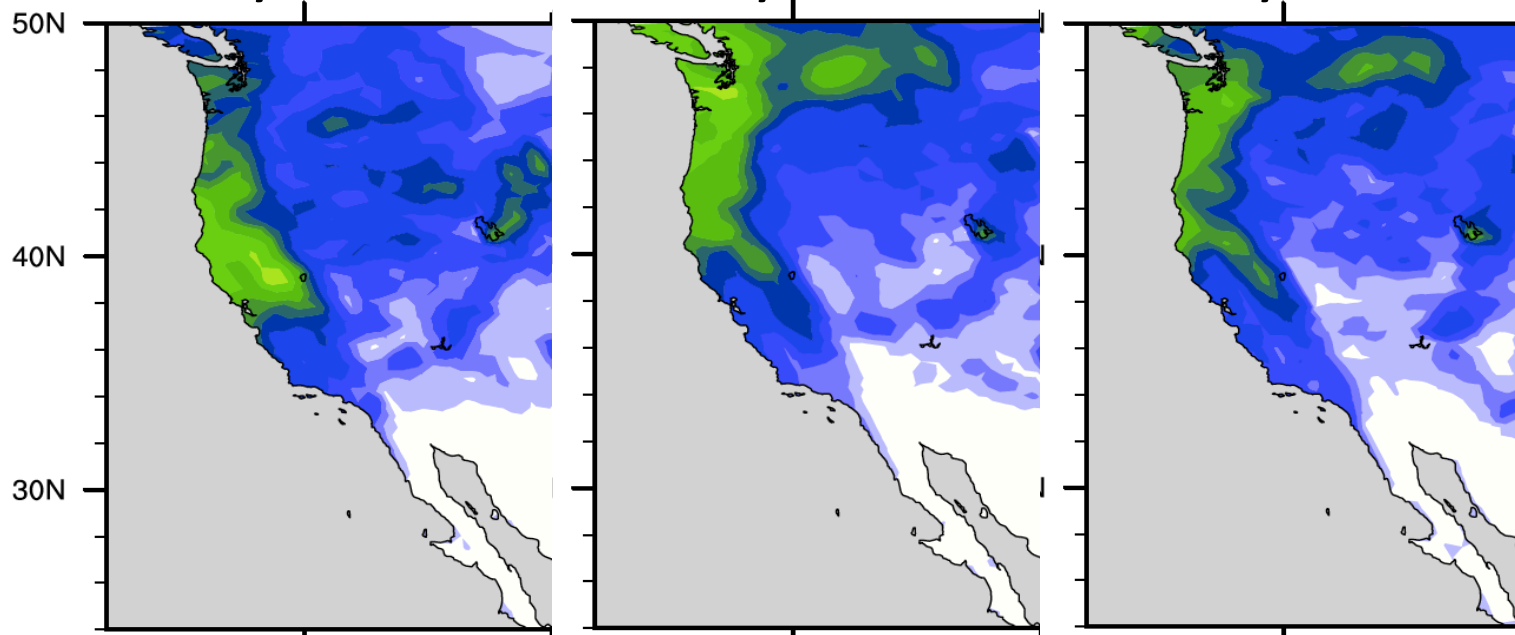
Precipitation is less Predictable

Control Ensemble

9-Day forecast

8-Day forecast

7-Day Forecast



Precipitation Feb 6-11 (mm/day)

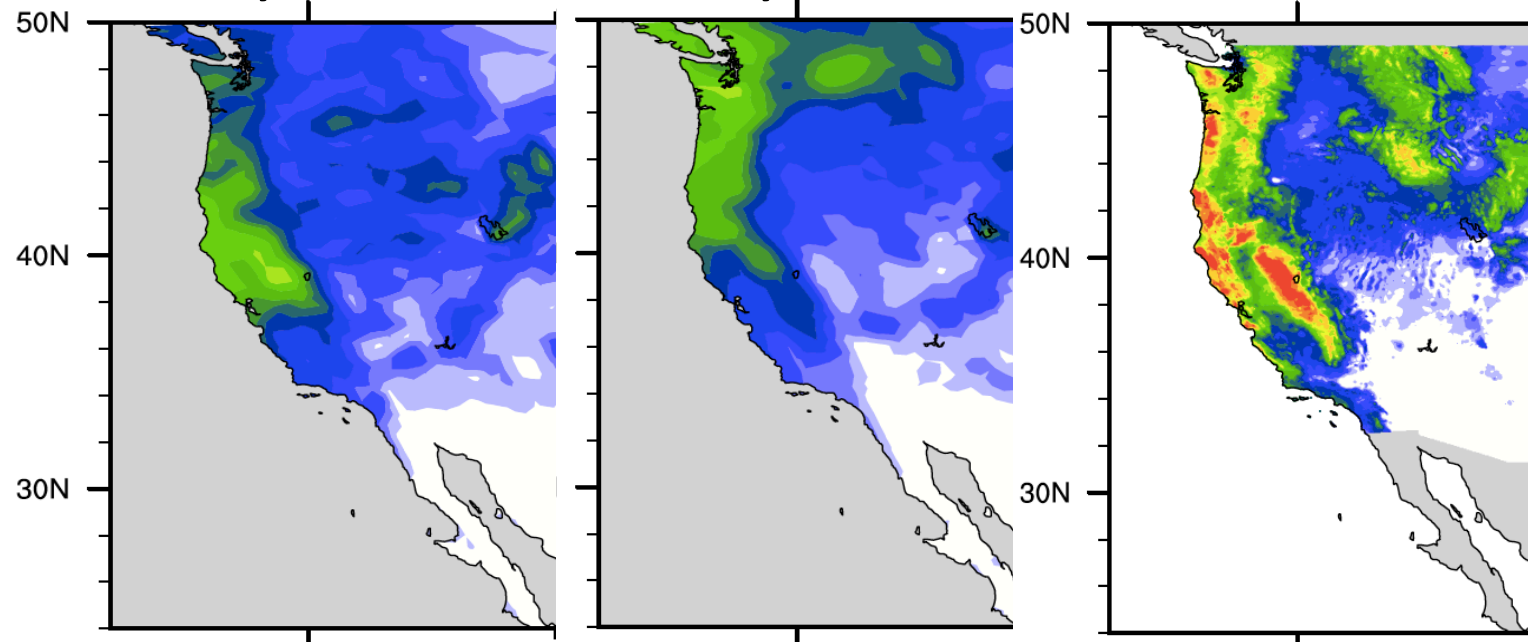
Overall Dry Bias

Control Ensemble

9-Day forecast

8-Day forecast

PRISM



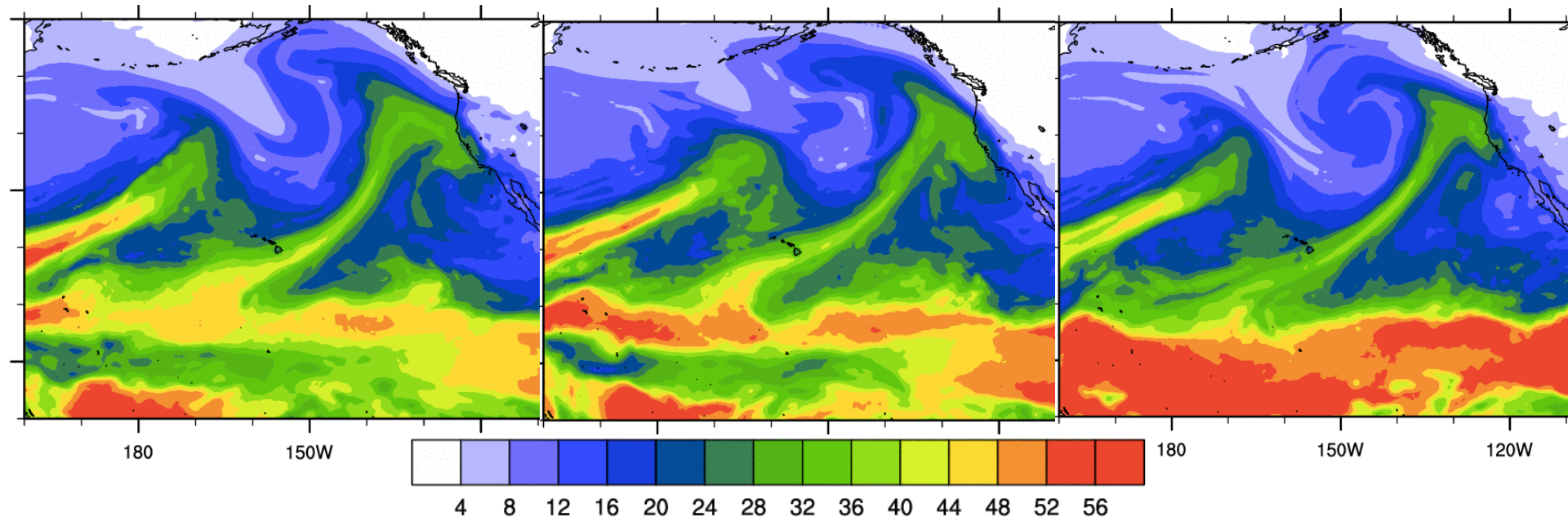
0.1 0.5 1 2 4 6 8 10 15 20 25 30 40 50 60

Precipitation Feb 6-11 (mm/day)

-IPO

Control

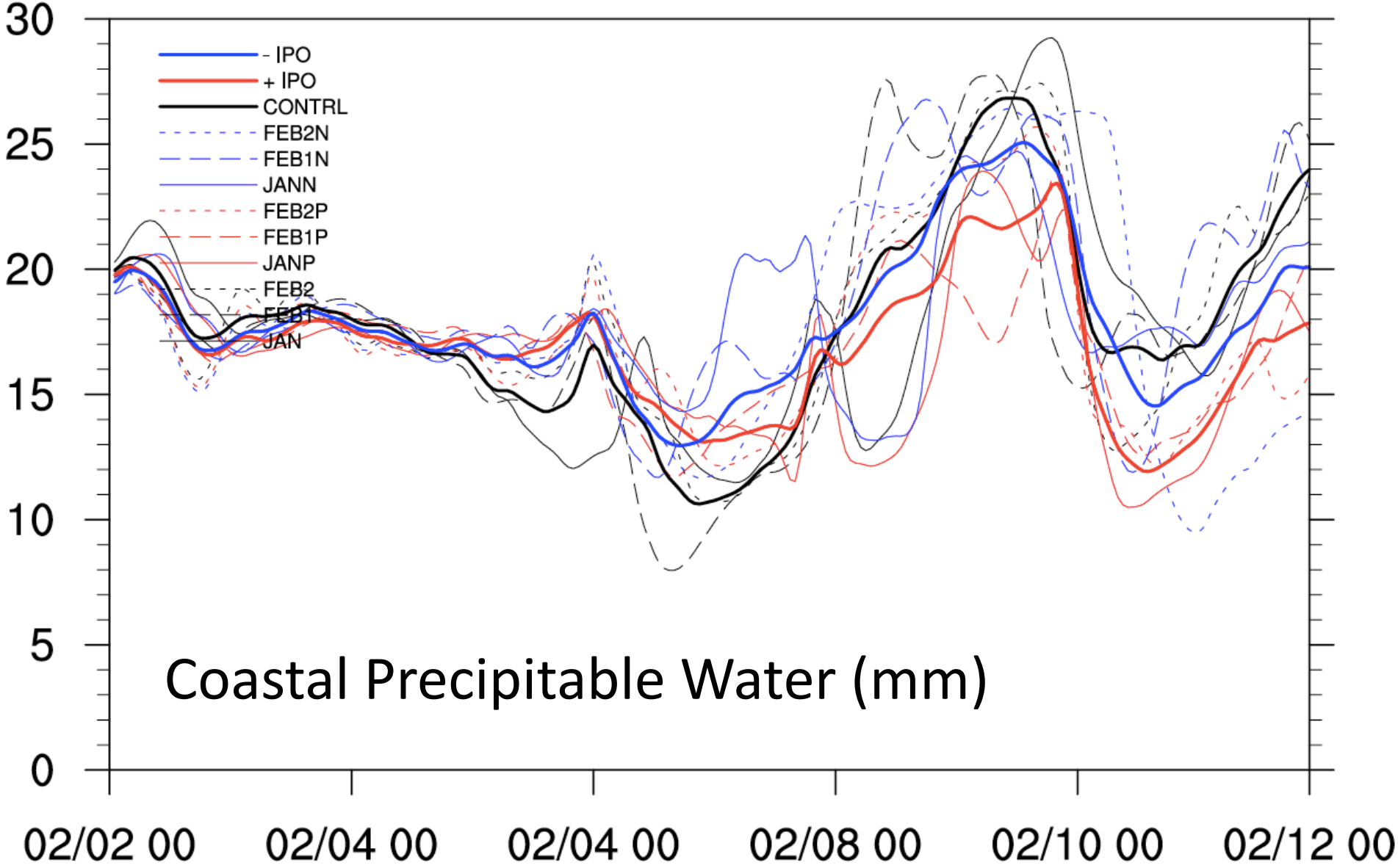
+IPO



Precipitable Water, Feb 9 (mm)

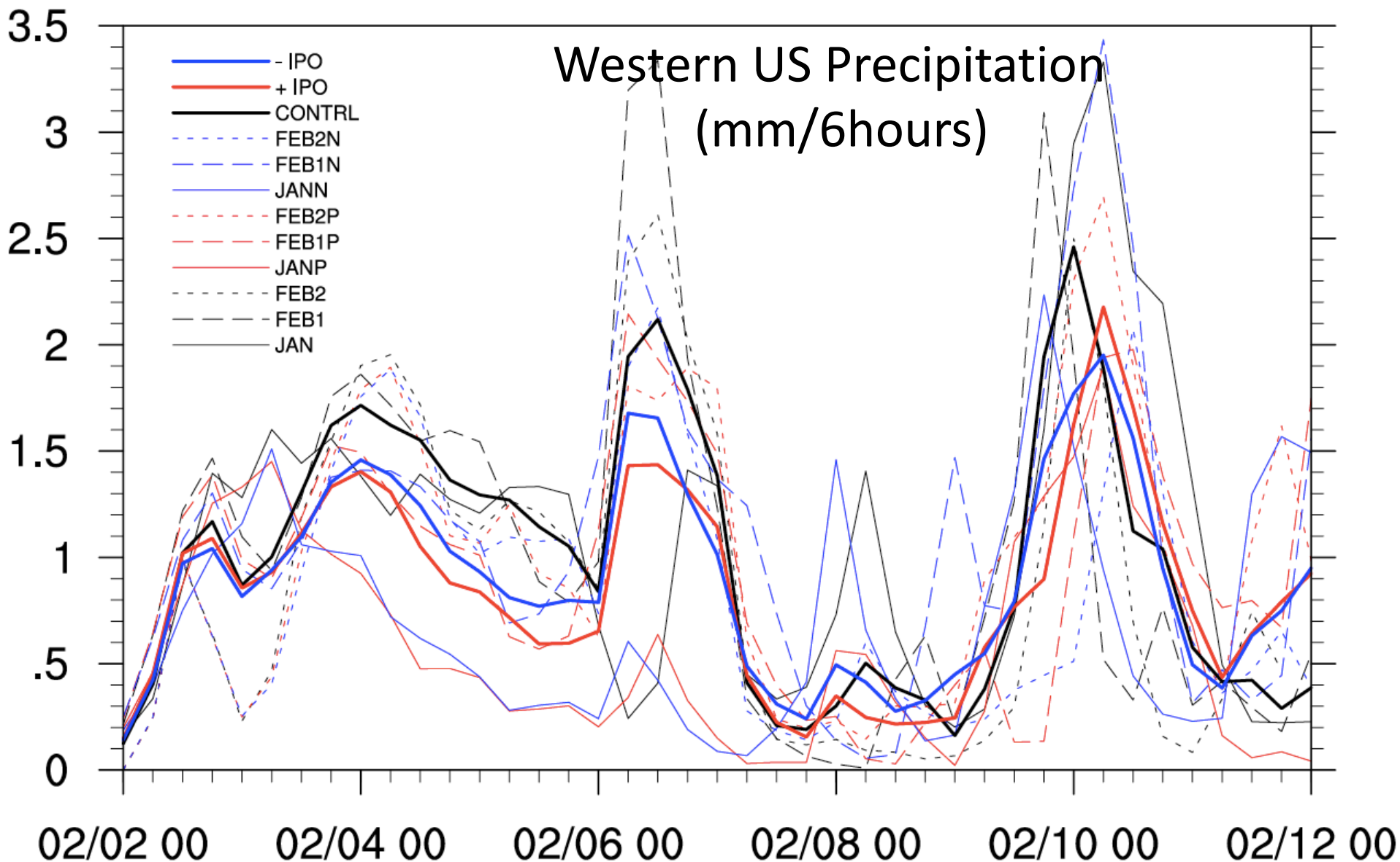
- No apparent influence on AR moisture

No Separation of Coastal PW



Coastal Precipitable Water (mm)

No Separation of Western US Precip

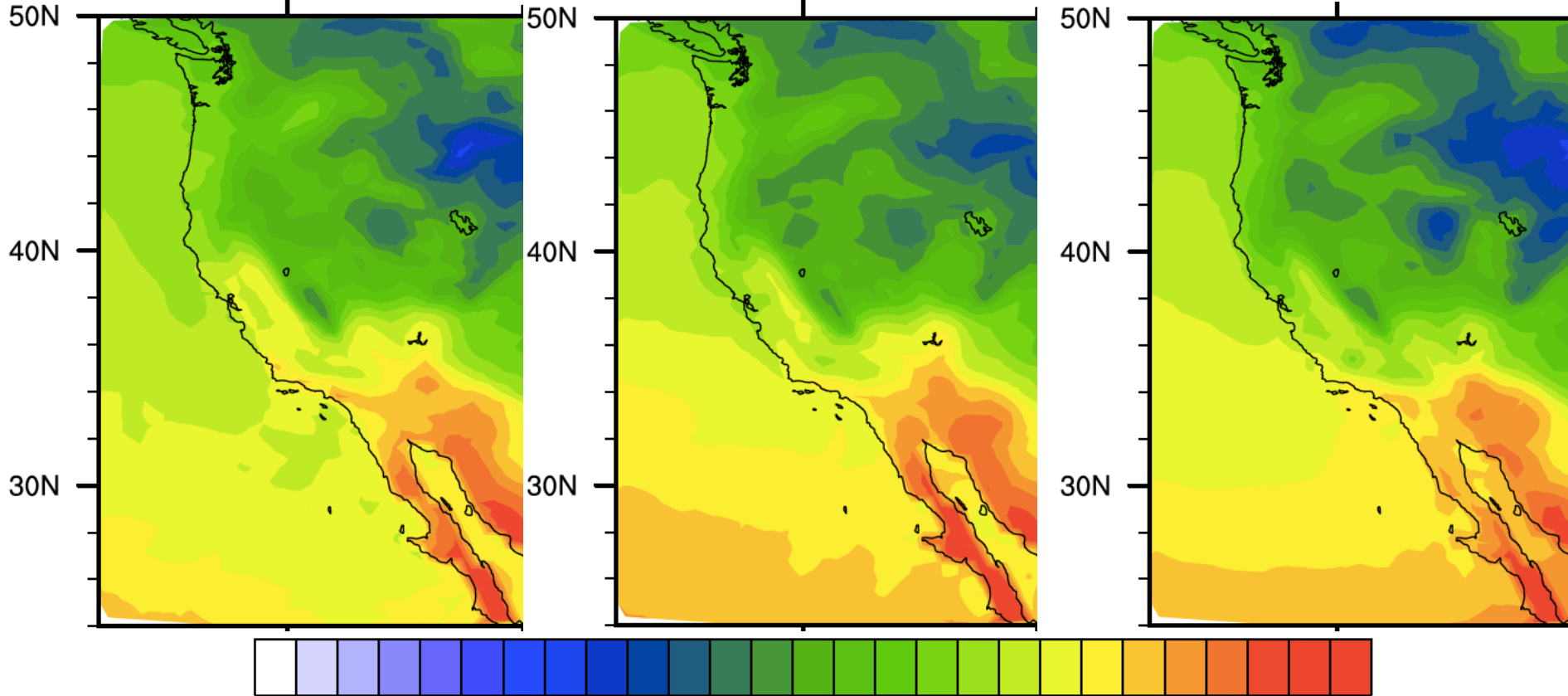


No Significant Temperature Change

-IPO Ensemble

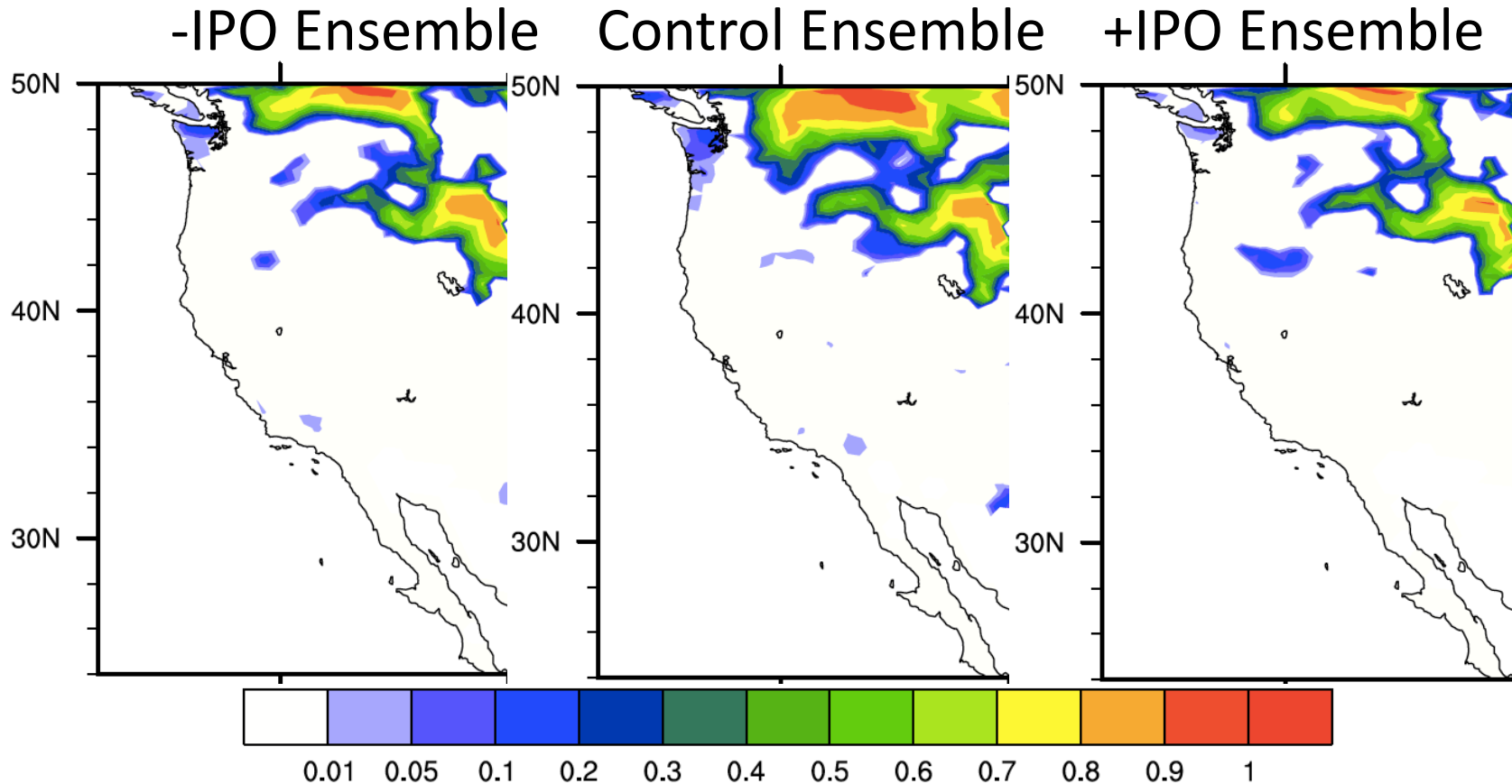
Control Ensemble

+IPO Ensemble



252 256 260 264 268 272 276 280 284 288 292 296 300
Ensemble Mean 2m Temperature (K), Feb 6-11

Snow Almost Absent



Snow Ratio, Feb 6-11

- Explored the influence of IPO sea surface temperatures on an Atmospheric River sequence.
- IPO influence was restricted to the equatorial region.
 - physical mechanisms?
- Planned perpetual January simulations:
 - Longer timescale variability,
 - AR frequency,
 - AR clustering.

More on UDECIDE from Heather Lazrus on Friday 3:10pm
GC53G-07.

done@ucar.edu



NCAR is Sponsored by NSF

Feb 2, 2017 SST Anomaly

